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REDUCING AERODYNAMIC DRAG FOR HIGHER EFFICIENCY OF HEAVY DUTY TRUCKS (CLASS 7-8)*

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Reduced fuel consumption for heavy vehicles can be achieved by altering truck shapes to decrease the aerodynamic resistance (drag). It is conceivable that present day truck drag coefficients can be reduced by as much as 50%, which represents a fuel savings of three billion gallons of diesel fuel per year of the roughly 15 billion gallons now consumed for truck highway travel at speeds of 60 miles per hour.

The aerodynamic design of heavy trucks is presently based upon estimations of performance derived from wind tunnel testing. No better methods have been available traditionally, and the designer/aerodynamicists are to be commended for achieving significant design improvements over the past several decades on the basis of limited quantitative information. Computer simulation of aerodynamic flow is a new possibility, but the truck manufacturers have not yet integrated state-of-the-art computational simulations into advanced design approaches to predict performance of optimized aerodynamic vehicles. This is due partly because currently available methods are not reliable in their predictions for complex tractor-trailer flows. This paper presents a project for reducing aerodynamic drag of heavy vehicles by developing and demonstrating new approaches for the simulation and analysis of aerodynamic flow around heavy truck vehicles. Greater use of newly-

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[1] On contract to NASA Ames from Aerospace Computing, Inc.

developed computational tools holds the possibility for reducing the number of prototype tests, cutting manufacturing costs, and reducing overall time to market.

Experimental verification and validation are also an important part of this approach. Experiments on a model of an integrated tractor-trailer are underway at NASA Ames Research Center and the University of Southern California. Companion computer simulations are being performed using varying state-of-the-art techniques, with application of more complex approaches, by Sandia National Laboratories, Lawrence Livermore National Laboratory, and California Institute of Technology. Experimental and computer simulation results will be presented and compared.

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